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**APPLICATION
FOR
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LETTERS PATENT**

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FOR: TELEPHONE APPARATUS AND
ALERT CONTROL METHOD

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TELEPHONE APPARATUS AND ALERT CONTROL METHOD

BACKGROUND OF THE INVENTION

1. Field of the invention

The present invention generally relates to a telephone apparatus such as a portable or mobile telephone, and in particular to a telephone apparatus having a communication history memory and an alert control method thereof.

2. Description of the Related Art

There has been proposed a telephone set having a communication history memory which is used to allow a user to check the communication history that is a sequential list of the calling and called times of day and the phone numbers of the other parties thereof. Accordingly, by requesting the communication history through an input device such as a keypad, the user is notified when communication was made with a certain person.

However, when the user forgets to check the communication history, a certain person who called to the user would be left in a state that no word has been heard in reply.

In Japanese Patent Application Unexamined Publication No. 8-181781, a voice mail system using a PHS (personal-handly phone system) terminal has been disclosed, which allows the user to

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check the status of its mailbox without telephoning the voice mail system. More specifically, when receiving a voice mail addressed to a subscriber, a service management office transmits an incoming-call occurrence notification, the incoming-call
5 occurrence time of day, and the caller phone number of the incoming call to the PHS terminal of the subscriber. Based on the incoming-call occurrence time of day received from the service management office, the PHS terminal determines whether a voice mail that its predetermined hold time has elapsed exists in the
10 mailbox. If such a voice mail exists, then the PHS terminal alerts the user by audible or silent alert to the presence of such a voice mail that its predetermined hold time has elapsed.

According to this conventional voice mail system, the user can be alerted about an incoming call only. Therefore,
15 communication with a certain person cannot be ensured sufficiently.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a telephone apparatus and an alert control method allowing communication with
20 a certain person to be ensured.

According to the present invention, when an elapsed time after the last-communication time of day with a certain person

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exceeds a predetermined time interval, the telephone apparatus alerts the user.

According to an aspect of the present invention, an alert control method in telephone equipment having an alert function, includes the steps of: a) storing time data related to a name of a person to communicate with in a phonebook database; b) determining based on the time data whether a predetermined time interval has elapsed without communicating with the person; and c) alerting when it is determined that the predetermined time interval has elapsed without communicating with the person. The time data may be a last-communication time of day at which communication with the person was made last.

The step (b) may include the steps of: b.1) reading a current time of day from a timer; b.2) calculating an elapsed time from the last-communication time of day to the current time of day; and .3) determining whether the elapsed time exceeds the predetermined time interval.

The last-communication time of day may be initially set to a time of day when data related to the person is registered into the phonebook database. The last-communication time of day may be updated each time communication with the person is terminated. The predetermined time interval may be arbitrarily determined depending on a user's instruction.

The alerting of the step (c) may be performed by driving at least one of a speaker, a vibrator, and a display.

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According to another aspect of the present invention, an alert control method includes the steps of: a) storing a last-communication time of day related to a name of each of a plurality of persons to communicate with in a phonebook database; 5 b) dividing the plurality of persons into a plurality of groups; c) determining a before-alert time interval for each of the groups, wherein the before-alert time interval is a time interval during which communication with the person is not made before alerting; d) determining whether the before-alert time interval has elapsed 10 after the last-communication time of day; and e) alerting when it is determined that the before-alert time interval has elapsed after the last-communication time of day.

According to further another aspect of the present invention, an alert control method includes the steps of: a) 15 storing time data related to a name of a person to communicate with in a phonebook database; b) storing an alert-inhibition time period during which alert is inhibited; c) determining based on the time data whether a predetermined time interval has elapsed without communicating with the person; d) alerting when a current 20 time of day falls out of the alert-inhibition time period and it is determined that the predetermined time interval has elapsed without communicating with the person; and e) inhibiting alert when the current time of day falls into the alert-inhibition time period even if it is determined that the predetermined time 25 interval has elapsed without communicating with the person.

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In the step (e), an audible alert by the speaker and/or the vibrator may be inhibited and a silent alert on the display may be permitted.

According to still another aspect of the present invention,
5 the alert control method further includes the steps of: storing an alert list containing persons targeted for alert; and displaying the alert list in form of a menu on a display so that a desired one is selected from the alert list to make a call to the desired one.

10 A telephone apparatus according to the present includes: a phonebook database for storing time data related to a name of a person to communicate with; and a controller for determining based on the time data whether a predetermined time interval has elapsed without communicating with the person and starting the
15 alert function when it is determined that the predetermined time interval has elapsed without communicating with the person.

A telephone apparatus according to the present includes: a phonebook database for storing a last-communication time of day related to a name of each of a plurality of persons to
20 communicate with, wherein the plurality of persons is divided into a plurality of groups; and a controller for determining a before-alert time interval for each of the groups, wherein the before-alert time interval is a time interval during which communication with the person is not made before alerting.
25 determining whether the before-alert time interval has elapsed

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after the last-communication time of day, and starting the alert function when it is determined that the before-alert time interval has elapsed after the last-communication time of day.

A telephone apparatus according to the present includes:

- 5 a phonebook database for storing time data related to a name of a person to communicate with; an alert-inhibition timetable storing an alert-inhibition time period during which alert is inhibited; and a controller for determining based on the time data whether a predetermined time interval has elapsed without
10 communicating with the person, starting the alert function when a current time of day falls out of the alert-inhibition time period and it is determined that the predetermined time interval has elapsed without communicating with the person, and inhibiting alert when the current time of day falls into the alert-inhibition
15 time period even if it is determined that the predetermined time interval has elapsed without communicating with the person.

As described above, according to the present invention, when an elapsed time after the last-communication time of day with a certain person exceeds a predetermined time interval, the
20 telephone alerts the user. Therefore, in the case where the phone number of a registered person has not been used for a long time or the registered before-alert time interval, the user is alerted and thereby the communication with that person is promoted.

Further, a plurality of registered names are divided into
25 a plurality of groups and a before-alert time interval can be

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Furthermore, an alert-inhibition time period can be set to a desired time period. Therefore, beeper sound or vibration is prevented from annoying the people around the telephone in conference or in sleep.

BRIEF DESCRIPTION OF THE DRAWINGS

15 Fig. 2 is a flowchart showing an alert registration
operation according to a first embodiment of the present
invention;

Fig. 3 is a flowchart showing an alert control operation according to the first embodiment of the present invention;

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Fig. 4 is a flowchart showing an operation of registering data of the other party into a phonebook database in the first embodiment of the present invention;

Fig. 5 is a flowchart showing an operation of updating the last-access time of day to the other party when the telephone originates a call in the first embodiment of the present invention;

Fig. 6 is a flowchart showing an operation of updating the last-access time of day to the other party when the telephone takes an incoming call in the first embodiment of the present invention;

Fig. 7 is a diagram showing an example of contents of the phonebook database in the first embodiment of the present invention;

Fig. 8 is a diagram showing an example of a combination of group and before-alert time interval in the phonebook database according to a second embodiment of the present invention;

Fig. 9 is a flowchart showing an alert registration operation according to the second embodiment of the present invention;

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Fig. 10 is a diagram showing an example of contents of the phonebook database in the second embodiment of the present invention;

Fig. 11 is a diagram showing an example of an alert-inhibition timetable according to a third embodiment of the present invention;

Fig. 12 is a flowchart showing an alert control operation according to the third embodiment of the present invention;

Fig. 13 is a diagram showing an operation of setting alert-inhibition time periods according to the third embodiment of the present invention;

Fig. 14 is a diagram showing an example of a displayed alert image according to the first to third embodiments of the present invention;

Fig. 15 is a diagram showing an example of a displayed menu of registered persons to communicate with according to the first to third embodiments of the present invention;

Fig. 16 is a diagram showing an example of an alert list

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according to a fourth embodiment of the present invention; and

Fig. 17 is a flowchart showing a calling operation using the alert list according to the fourth embodiment of the present invention.

5 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Fig. 1, there is shown a mobile telephone in accordance with the present invention. The mobile telephone is provided with a radio system 20, which transmits and receives a radio signal to and from a radio base station (not shown) under control of a control section 10. The control section 10 includes a program-controlled processor such as a central processing unit (CPU). A control program for the mobile telephone is stored in a read-only memory (not shown) and runs on the program-controlled processor of the control section 10 to control all operations of the mobile telephone including an alert control operation as described later.

The mobile telephone is further provided with a memory 30 including a phonebook (phone directory) database 110 and other timetables, which can be accessed by the control section 10. As described later, the phonebook database 110 retrievably stores a plurality of telephone numbers and related data as shown in

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Fig. 7.

An input device 40 such as a keypad including a ten-key is provided on the main surface of a housing of the mobile telephone. The input device 40 is used by the user to enter various instructions such as registering of a new telephone number, retrieval of a telephone number, dialing of a selected telephone number and other necessary operations.

A speaker 50 is used to generate reception voice and an audible alert for notifying the user of incoming call or for alerting the user that communication with a certain person has not been made during a preset time interval. It is the same with a vibrator 90. A microphone 60 is used to input transmission voice.

Necessary information is displayed on a display 70 under control of the control section 10. The display 70 may employ a liquid-crystal display (LCD) or light-emitting diodes (LEDs).

A timer 80 outputs a current time of day or other time data to the control section 10. The control section 10 uses time data from the timer 80 to determine the incoming-call occurrence time of day, the originating-call occurrence time of day, the communication termination time of day, a communication time, and to calculate an elapsed time after the last-communication time of day for each entry in the phonebook database 110. As described later, when an elapsed time after the last-communication time of day for a registered person exceeds a preset time interval,

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the control section 10 drives the speaker 50, the vibrator, or the display 70 or a combination thereof to notify the user that communication with that person has not been made during the preset time interval. This causes the user to be prevented from
5 forgetting to get contact with that person.

FIRST EMBODIMENT

A first embodiment of the present invention will be described hereafter with reference to Figs. 1-7.

Alert registration

10 Referring to Fig. 2, a user of the mobile telephone as shown in Fig. 1 manually operates the input device 40 to enter an alert registration request. The control section 10 monitors the input device 40 to determine whether the alert registration is requested (step 201). If it is determined that the alert
15 registration is requested (YES at step 201), the control section 10 prompts on the display 70 the user to select a name targeted for alert to silence and enter a time interval before alerting. When the user selects the name and enters the before-alert time interval (step 202), the control section 10 searches the
20 phonebook database 110 for the selected name and associates the before-alert time interval with information related to the selected name to store it into the phonebook database 110 as shown in Fig. 7 (step 203).

If it is determined that the alert registration is not
25 requested (NO at step 201), the control section 10 further

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determines whether the user requests to delete an existing alert registration (step 204). When alert registration deletion is requested (YES at step 204), the control section 10 prompts the user on the display 70 to enter a name targeted for alert registration deletion. When the user uses the input device 40 to select the name targeted for alert registration deletion (step 205), the control section 10 searches the phonebook database 110 for the selected name and resets the alert registration associated with the selected name to "no setting" to delete the alert registration (step 206). When alert registration deletion is not requested (NO at step 204), the alert registration is terminated without any change to the phonebook database 110.

Taking as an example the case where "Yamada Taro" registered in the phonebook database 110 is set to alert registration such that alert is made after three days of silence (see Fig. 7). The user selects the alert registration at the step 201 and selects "Yamada Taro" as a person targeted for alert registration and enters "three days" as the before-alert time interval at step 202. The control section 10 searches the phonebook database 110 for the selected name "Yamada Taro" and associates the before-alert time interval "three days" with information related to the selected name "Yamada Taro" to store it into the phonebook database 110 as shown in Fig. 7.

Taking as an example the case where "Sato Eisaku" registered in the phonebook database 110 is set to alert

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registration deletion. The user uses the input device 40 to select the name "Sato Eisaku" targeted for alert registration deletion at step 205. The control section 10 searches the phonebook database 110 for the selected name "Sato Eisaku" and
5 resets the alert registration associated with the selected name "Sato Eisaku" to "no setting" to delete the alert registration at step 206.

Alert control

Referring to Fig. 3, the control section 10 determines
10 whether alert to silence has been already registered (step 301). If no alert to silence is registered (NO at step 301), the alert control is completed.

When the alert to silence has been already registered (YES at step 301), the control section 10 sequentially checks entries
15 in the phonebook database 110 to determine whether the before-alert time interval has been set (step 302). If the before-alert time interval of an entry has been reset to "No setting" (NO at step 302), the control section 10 shifts the alert control to the next entry (step 308).

20 If the before-alert time interval of an entry has been set (YES at step 302), then the control section 10 reads the current time of day from the timer 80 (step 303). Thereafter, the control section 10 reads the last-access time of day when last
25 communicated with the person of a selected entry from the phonebook database 110 (step 304). Then, the control section

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10 calculates the time period of silence elapsed after the last-access time of day (step 305) and determines whether the elapsed time exceeds the before-alert time interval that has been set (step 306).

- 5 If the elapsed time exceeds the before-alert time interval (YES at step 306), the control section 10 alerts the user that the before-alert time interval of silence has elapsed by displaying alert information on the display 70 and driving the speaker or the vibrator (step 307). Thereafter, the control
- 10 section 10 shifts the alert control to the next entry (step 308) and repeatedly performs the steps 301-308 until all entries have been checked.

- Taking as an example the case where the before-alert time interval of "Suzuki Ichiro" has been set to 15 hours (see Fig.
- 15 7). When having selected the entry of "Suzuki Ichiro", the control section 10 reads the current time of day from the timer 80 at step 303. Here, it is assumed that the current time of day is 1999/06/01/10:06, that is, 10:06, June 1st, 1999. Thereafter, the control section 10 reads the last-access time
- 20 of day with "Suzuki Ichiro" from the phonebook database 110 at step 304. Here, the last-access time of day with "Suzuki Ichiro" is 1999/05/31/19:05. Therefore, the time period of silence elapsed after the last-access time of day is 15 hours and 1 minute. The control section 10 determines that the time period of silence
- 25 exceeds the before-alert time interval of 15 hours at step 306.

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Data entry

For example, in the case where phone number "070-4416-5525", the name "Nishida Hikari" and the before-alert time interval "1 month (30 days)" are entered into the phonebook database 110 at 15:22, May 25, 1999, the data of "Nishida Hikari" is stored in the phonebook database 110 as shown by the third entry (No. 3) of Fig. 7.

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Figure 1 consists of 12 bar charts, labeled (a) through (l), arranged in a 6x2 grid. Each chart displays the percentage of total protein in various fractions (S, P, C, M, B, A, H, L, V, W, X, Y, Z) for different cell lines and treatments. The y-axis is labeled 'Fraction' and the x-axis is labeled 'Protein'. The data is presented as a series of bars for each fraction, with the height of the bar indicating the percentage of total protein. The cell lines and treatments are: (a) Control, (b) 10⁻⁶ M, (c) 10⁻⁵ M, (d) 10⁻⁴ M, (e) 10⁻³ M, (f) 10⁻² M, (g) 10⁻¹ M, (h) 10⁰ M, (i) 10¹ M, (j) 10² M, (k) 10³ M, and (l) 10⁴ M. The fractions are: S (Supernatant), P (Pellet), C (Crude), M (Medium), B (Biomass), A (Aqueous), H (Heavy), L (Light), V (Vapor), W (Water), X (Xenon), Y (Yttrium), and Z (Zinc).

5 operation is not performed when the before-alert time interval is set to "No setting".

15 so as to perform a radial function or the like (step 503).
Thereafter, the control section 10 performs calling control (step 504) and communication control (step 505). The communication operation is kept (NO at step 506) until the communication is terminated.

25 When the before-alert time interval of the other party is not

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set to "No setting" (NO at step 508), the control section 10 reads the time of day at which the communication is terminated from the timer 80 (step 509). Thereafter, the control section 10 associates the data of the other party with the termination time
5 of day read from the timer 80 and stores these data into the entry of the other party of the phonebook database 110 (step 510). In other words, the old access time of day is replaced with the new access time of day that has been just read from the timer 80. In this way, the last-access time of day for the other party is
10 updated.

In the case where the user does not use the phonebook database 110 (NO at step 501), the control section 10 prompts the user to enter the phone number of a person to be called. When the user enters the phone number through the input device 40 (step
15 511), the control section 10 searches the phonebook database 110 to determine whether the entered phone number has been already registered in the phonebook database 110 (step 512). If already registered (YES at step 512), the control goes to the step 503 to store the data of the person into the memory 30. Thereafter,
20 the steps 504-510 are performed as described above.

When the entered phone number is not registered in the phonebook database 110 (NO at step 512), the control section 10 performs the calling control (step 513) and the communication control (step 514). The communication operation is kept (NO at
25 step 515) until the communication is terminated. When the

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communication is terminated by one of the calling party and the other party (YES at step 515), the control section 10 performs a termination operation (step 516) without updating the last-access time of day. As described before, when the
5 before-alert time interval of the other party is set to "No setting" (YES at step 508), the control section 10 terminates the process without updating the last-access time of day.

Next, the update operation of the last-access time interval in the case where the user takes the call from the other party
10 will be described hereafter. It should be noted that the update operation is not performed when the before-alert time interval of the other party is set to "No setting".

Referring to Fig. 6, the control section 10 determines whether CLIP (Calling Line Identification Presentation) function
15 has been set at the other party (step 601). In the case where CLIP function has been set at the other party (YES at step 601), the control section 10 detects the calling number of the other party and stores it into the memory 30 (step 602). Then, the control section 10 searches the phonebook database 110 to
20 determine whether the calling number of the other party has been already registered therein (step 603).

When the calling number of the other party has been already registered in the phonebook database 110 (YES at step 603), the control section 10 further determines whether the user takes the
25 call (off-hook) (step 604). When the user takes the call (YES

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at step 604), the control section 10 performs calling control (step 605) and communication control (step 606). The communication operation is kept (NO at step 606) until the communication is terminated.

- 5 When the communication is terminated by one of the calling party and the other party (YES at step 606), the control section 10 performs a termination operation (step 607). Then, the control section 10 determines whether the before-alert time interval of the other party is set to "No setting" (step 608).
- 10 When the before-alert time interval of the other party is not set to "No setting" (NO at step 608), the control section 10 reads the time of day at which the communication is terminated from the timer 80 (step 609). Thereafter, the control section 10 associates the data of the other party with the termination time
- 15 of day read from the timer 80 and stores these data into the entry of the other party of the phonebook database 110 (step 610). In other words, the old access time of day is replaced with the new access time of day that has been just read from the timer 80. In this way, the last-access time of day for the other party is
- 20 updated.

- When CLIP function is not set at the other party (NO at step 601) or when the calling number of the other party is not registered in the phonebook database 110 (NO at step 603), the control section 10 further determines whether the user takes the
- 25 call (off-hook) (step 611). When the user takes the call (YES

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at step 611), the control section 10 performs calling control (step 612) and communication control (step 613). The communication operation is kept (NO at step 613) until the communication is terminated. When the communication is terminated by one of the calling party and the other party (YES at step 613), the control section 10 performs a termination operation (step 614) without updating the last-access time of day. As described before, when the before-alert time interval of the other party is set to "No setting" (YES at step 608), the control section 10 terminates the process without updating the last-access time of day.

As described above, according to the first embodiment, when the phone number of a registered person has not been used for the registered before-alert time interval or more, the user is alerted and thereby the communication with that person is promoted.

SECOND EMBODIMENT

An alert control method according to a second embodiment of the present invention allows a before-alert time interval to be set for each registration group.

As shown in Fig. 8, for example, in the case of a group being "Client", the before-alert time interval is automatically set to "three days". In the case of a group being "Friend", the before-alert time interval is automatically set to "15 hours".

Referring to Fig. 9, a user of the mobile telephone as shown

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in Fig. 1 manually operates the input device 40 to enter an alert registration request. The control section 10 monitors the input device 40 to determine whether the alert registration is requested (step 901). If it is determined that the alert registration is requested (YES at step 901), the control section 10 prompts on the display 70 the user to select a group targeted for alert to silence and enter a time interval before alerting. When the user selects the group and enters the before-alert time interval (step 902), the control section 10 searches the phonebook database 110 for entries belonging to the selected group and replaces the before-alert time interval for each entry belonging to the selected group with the new one and store it into the phonebook database 110 as shown in Fig. 8 (step 903).

If it is determined that the alert registration is not requested (NO at step 901), the control section 10 further determines whether the user requests to delete an existing alert registration (step 904). When alert registration deletion is requested (YES at step 904), the control section 10 prompts the user on the display 70 to enter a group targeted for alert registration deletion. When the user uses the input device 40 to select the group targeted for alert registration deletion (step 905), the control section 10 searches the phonebook database 110 for the selected group and resets the alert registration associated with the selected group to "no setting" to delete the alert registration (step 906). When alert

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registration deletion is not requested (NO at step 904), the alert registration is terminated without any change to the phonebook database 110.

As shown in Fig. 10, for example, the user enters data such
5 that the before-alert time interval of the group "Client" is set
to "three days" and the before-alert time interval of the group
"Friend" is set to "15 hours", the control section 10
automatically replaces the before-alert time interval of the
entries belonging to group "Client" with "three days" and the
10 before-alert time interval of the entries belonging to group
"Friend" with "15 hours".

THIRD EMBODIMENT

An alert control method according to a third embodiment of the present invention allows an alert-inhibition time period to be set so as to prevent beeper sound or vibration from annoying the people around the telephone in conference or in sleep.

As shown in Fig. 11, an alert-inhibition time period during which alert is inhibited can be registered in an alert-inhibition timetable 120 that is provided in the memory 30. For example, as shown by the setting No. 1, the alert-inhibition time period is set to the same time period 00:00 to 08:00 every day. Further, as shown by the setting No. 2, the alert-inhibition time period may be arbitrary set to a time period from a user-designated time of day to another user-designated time of day.

25 Alert control

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When it is permitted (YES at step 1207), the control section 10 alerts the user that the before-alert time interval of silence has elapsed by displaying alert information on the display 70 and driving the speaker or the vibrator (step 1208). When it is inhibited (NO at step 1207), the control section 10 alerts the user by only displaying alert information on the display 70 (step 1209). Thereafter, the control section 10 shifts the alert control to the next entry (step 1210) and repeatedly performs the steps 1201-1209 until all entries have been checked.

10 Assuming that the alert-inhibition time period is set to the time period from 00:00 to 08:00 every day as the setting No. 1 of Fig. 11 and the current time is "07:00", it is determined that the current time falls into the alert-inhibition time period (step 1207). Therefore, the user is alerted by only displaying
15 alert information on the display 70 (step 1209).

The alert-inhibition time period is registered into the alert-inhibition timetable 120 as described hereafter.

Referring to Fig. 13, the control section 10 determines whether the alert-inhibition time registration is requested
20 (step 1301). If it is determined that the alert-inhibition time registration is requested (YES at step 1301), the control section 10 prompts on the display 70 the user to enter the alert-inhibition time period. When the user enters the alert-inhibition time period (step 1302), the control section 10 stores it into the
25 alert-inhibition timetable 120 as shown in Fig. 11 (step 1303).

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As necessary, a plurality of alert-inhibition time periods may be registered. In this case, the user designates active one of the registered alert-inhibition time periods.

If it is determined that the alert-inhibition time registration is not requested (NO at step 1301), the control section 10 further determines whether the user requests to delete an existing alert-inhibition time registration (step 1304). When alert-inhibition registration deletion is requested (YES at step 1304), the control section 10 prompts the user on the display 70 to select an existing alert-inhibition time period to be deleted. When the user selects an alert-inhibition time period, the control section 10 deletes the selected alert-inhibition time period from the alert-inhibition timetable 120 (step 1305).

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FOURTH EMBODIMENT

According to a fourth embodiment of the present invention, the user is alerted by displaying alert information on the display 70 and/or driving the speaker 50 or the vibrator 90 and thereafter the alerting image is changed to an easy-to-call alerting image.

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As shown in Fig. 14, more specifically, an alerting image 160 is displayed on the display 70 provided in the housing 150 of the mobile telephone. Thereafter, as shown in Fig. 15, an easy-to-call alerting image is displayed such that the user easily makes a call to a desired one selected from a list of persons each exceeding the preset before-alert time intervals.

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Referring to Fig. 16, after alerting, the control section 10 creates an alert list 130 in the memory 30, the alert list 130 containing at least phone numbers and names of the persons each exceeding the preset before-alert time intervals. This
5 easy-to-call alerting image is maintained on screen until the user makes a call to one of the listed persons.

Referring to Fig. 17, when the easy-to-call alerting image is displayed on the display 70, the user selects a person to communicate with from the alert list displayed (step 1701). Then,
10 the control section 10 reads the phone number of the selected person from the alert list 130 and performs the calling and communication control operation (step 1702).

In this manner, the user looks at the easy-to-call alerting image on the display 70 and selects a person to communicate with
15 from the alert list displayed to make a call. Therefore, communication with a person exceeding the preset before-alert time intervals can be promoted.

It is to be understood that the present invention is not limited to the above-described embodiments and changes and
20 variations may be made without departing from the spirit of scope of the following claims.

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